The Use of Wallstent and SMART Stents in Carotid Stent-Supported Angioplasty

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LI ET AL.: ***The Use of Wallstent and SMART Stents in Carotid Stent-Supported Angioplasty.*** *In the endovascular approach of carotid stenosis treatment, stent-supported angioplasty is current state-of-the-art technique. Self-expandable stents are preferable to balloon-expandable stents due to the potential risk of deformation of the latter by external pressure. Wallstents and SMART stents are the more commonly used self-expandable stents. They appear to be of similar efficacy and safety but due to their different characteristics, their applications may be different according to different lesion characteristics. (J HK Coll Cardiol 2001;9:184-185)*

Carotid angioplasty, stent

摘要

在目前經導管技術進行的頸動脈粥樣硬化血管治療中，支架術是最現代的技術。自體擴張支架優於球囊擴張支架，因為後者由於外在的壓力有變形潛在的危險。Wallstent和SMART支架是較普遍應用的自體擴張支架。它們的功效和安全性好象很相似，但由於它們各自不同的特點，根據病變特點的不同，它們的作用可能不同。

關鍵詞：頸動脈成形術　　支架

Despite the great controversy and widely divergent opinions about its current therapeutic role, carotid angioplasty has been emerging as a treatment option in the management of extracranial carotid stenotic diseases, particularly in those subgroups with high surgical risks.[1,2] Its technique has been evolving throughout the past two decades, from the initially pure angioplasty to the current stent-supported angioplasty.

The ideal stent for carotid angioplasty should be one which has a good radial strength, high flexibility and pushability for easy delivery, narrow stent-mesh and the ability to resist deformation upon external pressure. Following the crush injury reports to those balloon-mounted stents, self-expandable stents are now the stents of choice in the majority of patients. From a global survey published successively in 1998 and 2000,[3,4] the use of balloon expandable stents has dropped from previously 53% to 34% (cumulative) while the use of self-expandable stents has increased from previously 39% to >60% (cumulative).

Wallstents (Boston Scientific Corporation) and SMART (Cordis) stents are the two more commonly used self-expandable stents.

Wallstents are self-expandable and are made of stainless steel alloy monofilaments. The braided meshwork design allows great flexibility but it also produces significant shortening during deployment. Accurate placement can be difficult but it provides a smooth inner contour to the stented segment. The latest version of Carotid Wallstent comes with a 0.014" system, which further enhances its flexibility and deliverability.

SMART stents, on the other hand, are made of nitinol (nickel-titanium alloy), which has the property of thermal memory. Unlike Wallstents, they have only minimal shortening during deployment and are more

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suitable for precise stenting of the internal carotid artery. Due to its expansion characteristics, the contour of the stented segment tends to be less smooth and may make passage of subsequent catheters e.g. aspiration catheters of distal protection devices, more difficult.

Till January 2001, 25 patients have received carotid stent-supported angioplasty at Queen Elizabeth Hospital, Hong Kong. Of these, 11 patients have received the SMART stents and 14 patients have received the Wallstents. In the Wallstent series, the age of the patients ranged from 56 to 81 years (mean 70.2 ±6.9 years). The degree of pre-operative stenoses of the lesions, length of the lesions and the residual stenoses were 70-91% (mean 83.5±7.2 %), 7.0-25.1 mm (mean 18.5±6.2 mm) and 0-24% (8.6±9.8%) respectively. In the SMART stent series, the age of the patients ranged from 52 to 79 years (mean 69.4±7.9 years). The degree of pre-operative stenoses of the lesions, length of the lesions and the residual stenoses were 70-99% (mean 87±9.4%), 8-38 mm (20.7±9.7 mm) and 0-36% (mean 16.1±14.2%) respectively. All cases were successful with no procedure-related complications. Both stents appeared safe and effective. The only problem encountered with the SMART stents was the difficulty in passing a sharp-ended aspiration catheter of the Percusurge distal protection system.

In general, the stents would be deployed from the internal to the common carotid artery unless there is more than 1-2 cm normal segment in the internal carotid artery cranial to the bifurcation, in which case only the internal carotid artery may be stented. The size of the stent should be tailored to the reference diameter of the common carotid artery. If not certain, always use a larger and longer stent. The 0.014 version of Carotid Wallstent has a more favorable profile than the 0.018 SMART stent. It is easy to deploy but one has to be alert about its significant shortening after deployment. A rule of thumb is to place 1/3 of the unopened system distal to the lesion in the internal carotid artery and 2/3 proximately in the common carotid artery because more shortening would be observed in the larger common carotid artery.

On the other hand, the SMART stent, due to its minimal shortening, may be more suitable if one wants to stent the internal carotid artery only. Due to its expansion characteristics, a good pre-dilatation is more important before deployment than in the case with Carotid Wallstent. In case of angulated lesions, Carotid Wallstent appears to be a better choice.

The exact role of carotid angioplasty has yet to be confirmed by randomized trials and the ideal stent is yet to be designed. At present, both the wallstents and the self-expandable nitinol stents would continue to be the main stents of choice in carotid angioplasty. In view of their different characteristics as discussed, their application may be different with different lesion characteristics.

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